National Institute of Environmental Health Sciences

Phenotypic plasticity mediates climate change responses among invasive and indigenous arthropods

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Abstract:

Synergies between global change and biological invasion have been identified as a major potential threat to global biodiversity and human welfare. The global change-type drought characteristic of many temperate terrestrial ecosystems is especially significant because it will apparently favour invasive over indigenous species, adding to the burden of conservation and compromising ecosystem service delivery. However, the nature of and mechanisms underlying this synergy remain poorly explored. Here we show that in a temperate terrestrial ecosystem, invasive and indigenous springtail species differ in the form of their phenotypic plasticity such that warmer conditions promote survival of desiccation in the invasive species and reduce it in the indigenous ones. These differences are consistent with significant declines in the densities of indigenous species and little change in those of invasive species in a manipulative field experiment that mimicked climate change trends. We suggest that it is not so much the extent of phenotypic plasticity that distinguishes climate change responses among these invasive and indigenous species, as the form that this plasticity takes. Nonetheless, this differential physiological response provides support for the idea that in temperate terrestrial systems experiencing global change-type drought, invasive species may well be at an advantage relative to their indigenous counterparts.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Meteorological Factors, Temperature

Temperature: Fluctuations

Geographic Feature:

resource focuses on specific type of geography

Other Geographical Feature

Other Geographical Feature : sub-antarctic

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Africa

African Region/Country: African Country

Other African Country: South Africa

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified